I claim:

1. A plasma source, comprising:

a discharge cavity having a first width, wherein said discharge cavity includes a top portion and a wall portion;

a nozzle disposed on said top portion and extending outwardly therefrom, wherein said nozzle is formed to include an aperture extending through said top portion and into said discharge cavity, wherein said aperture has a second width, wherein said second width is less than said first width;

a first power supply;

at least one cathode electrode connected to said first power supply, wherein said cathode electrode is capable of supporting at least one magnetron discharge region within said discharge cavity;

a plurality of magnets disposed adjacent said wall portion, wherein said plurality of magnets create a null magnetic field point within said discharge cavity;

a conduit, other than said aperture, disposed in said discharge cavity for introducing an ionizable gas into said discharge cavity.

2. The plasma source of claim 1, wherein said ionizable gas is injected between said cathode and said nozzle within said discharge cavity.

3. The plasma source of claim 1, wherein said plurality of magnets comprises one or more electromagnets.

4. The plasma source of claim 1, wherein 2 of the 3 axial magnetic field regions adjacent to said null point pass through said cathode surface, and wherein the third axial magnetic field comprises the mirror confinement region emanating through said nozzle.

5. The plasma source of claim 1, wherein said null magnetic field point is located along the center-line of said aperture.

6. The plasma source of claim 1 wherein said cathode material comprises a secondary electron emission coefficient greater than about 1.

7. The plasma source of claim 1, wherein said nozzle is interconnected with said first power supply such that said nozzle comprises an anode.

8. The plasma source of claim 1, wherein said nozzle is electrically floating.

9. The plasma source of claim 1, wherein said nozzle is electrically connected to ground.

10. The plasma source of claim 1, further comprising a second power supply, wherein said second power supply is connected to said nozzle such that said nozzle comprises an anode.

11. The plasma source of claim 7, wherein said second power supply is selected from the group consisting of a DC power supply, an AC power supply, and an RF power supply

12. A plasma processing apparatus, comprising:

a beam plasma source comprising a discharge cavity having a first width, wherein said discharge cavity includes a top portion and a wall portion; a nozzle disposed on said top portion and extending outwardly therefrom, wherein said nozzle is formed to include an aperture extending through said top portion and into said discharge cavity, wherein said aperture has a second width, wherein said second width is less than said first width; a power supply, wherein said wall portion is interconnected to said power supply and wherein said wall portion comprises a cathode; a plurality of magnets disposed adjacent to and external to said discharge cavity, wherein said plurality of magnets create a null magnetic field point within said discharge cavity; a conduit, other than said aperture, disposed in said discharge cavity for introducing an ionizable gas into said discharge cavity;

a process chamber, wherein said beam plasma source is disposed within said process chamber;

a substrate disposed within said process chamber, wherein said substrate is external to said beam plasma source.

13. The plasma processing apparatus of claim 12, further comprising an anode disposed within said process chamber, wherein said anode is not physically attached to said plasma beam source.

14. The plasma processing apparatus of claim 12, wherein said beam plasma source further comprises a cusp magnetic field producing at least one magnetron confinement one within said cathode cavity.

15. A plasma processing apparatus, comprising:

an enclosure defining a cavity, wherein said enclosure is formed to include a

nozzle;

a power supply interconnected with said enclosure such that said enclosure comprises a cathode electrode;

a cusp magnetic field defining a null magnetic field point disposed within said cavity;

wherein said cusp magnetic field comprises a first portion and a second portion, wherein said first portion creates a closed drift electron magnetron confinement region within said cathode cavity, and wherein said second portion produces a mirror confinement region passing through said nozzle.

16. A method to treat a substrate with a plasma beam, comprising the steps of:

providing a beam plasma source comprising a discharge cavity having a first width, wherein said discharge cavity includes a top portion and a wall portion; a nozzle disposed on said top portion and extending outwardly therefrom, wherein said nozzle is formed to include an aperture extending through said top portion and into said discharge cavity, wherein said aperture has a second width, wherein said second width is less than said first width; a power supply, wherein said wall portion is interconnected to said power supply and wherein said wall portion comprises a cathode; a plurality of magnets disposed adjacent to and external to said discharge cavity; a conduit, other than said aperture, disposed in said discharge cavity for introducing an ionizable gas into said discharge cavity;

providing a process chamber;

disposing said beam plasma source within said process chamber;

providing a substrate;

disposing said substrate within said process chamber, wherein said substrate is external to said beam plasma source;

creating a null magnetic field point within said discharge cavity;

introducing an ionizable gas into said discharge cavity via said conduit;

igniting a plasma within said discharge cavity;

projecting said plasma through said nozzle;

directing said plasma onto said substrate.

17. The method of claim 16, further comprising the steps of:

generating a plurality of electrons within said discharge cavity, wherein a portion of said plurality of electrons passing through said null magnetic field point pass out of said discharge cavity through said nozzle.

18. The method of claim 17, further comprising the step of forming three mirror magnetic field electron confinement zones within said discharge cavity, wherein each of said three mirror magnetic field electron confinement zones extend outwardly from said null magnetic field point.

19. The method of claim 18, wherein one of said mirror magnetic field electron confinement zones extends through said aperture.